

WHAT IS CLAIMED IS:

1. A lithographic projection apparatus, comprising:
  - a radiation system constructed and arranged to provide a projection beam of radiation;
  - a support structure constructed and arranged to support a patterning device, the patterning device constructed and arranged to pattern the projection beam according to a desired pattern;
  - a substrate table constructed and arranged to hold a substrate;
  - a projection system constructed and arranged to project the patterned beam onto a target portion of the substrate;
  - a base to which the support structure and the substrate table are mounted; and
  - a reference frame compliantly mounted to the base, wherein the projection system comprises at least one optical element mounted on a projection frame that is compliantly mounted to the reference frame.
2. A lithographic projection apparatus according to claim 1, wherein an eigenfrequency of the projection frame compliantly mounted to the reference frame is between about 10 and 30 Hz.
3. A lithographic projection apparatus according to claim 1, wherein an eigenfrequency of the reference frame compliantly mounted to the base is about 0.5 Hz.
4. A lithographic projection apparatus according to claim 1, wherein the projection system is compliantly mounted to the reference frame by at least three compliant mounts.
5. A lithographic projection apparatus according to claim 1, wherein the projection system is mounted to the reference frame on nodal axes of a dominant mode of bending vibration of the reference frame or a torsional vibration of the reference frame.
6. A lithographic projection apparatus according to claim 1, wherein the projection system is compliantly mounted to the reference frame by at least one compliant mount, the

compliant mount comprising:

a T-shaped member with one of the projection system and the reference frame attached to both ends of a first elongate member of the T-shaped member and the other of the projection system and the reference frame is attached to an end of a second elongate member of the T-shaped member.

7. A lithographic projection apparatus according to claim 6, wherein the T-shaped member has an internal first eigenfrequency that is greater than 1000 Hz.

8. A lithographic projection apparatus according to claim 1, wherein the projection system is compliantly mounted to the reference frame by at least one compliant mount that is one of an air-mount, a spring and a magnetic support.

9. A lithographic projection apparatus according to claim 1, wherein motion of the projection system relative to the reference frame is damped.

10. A lithographic projection apparatus according to claim 9, wherein the motion of the projection system relative to the reference frame is actively damped by piezoelectric actuators or Lorentz-force actuators.

11. A device manufacturing method, comprising:

providing a substrate that is at least partially covered by a layer of radiation-sensitive material;

projecting a patterned beam of radiation onto a target portion of the layer of radiation-sensitive material using a projection system;

supporting a reference frame, a support structure constructed and arranged to support a patterning device, and a substrate table constructed and arranged to hold the substrate, on a base, wherein the reference frame is compliantly mounted to the base and the projection system is mounted to the reference frame; and

compliantly mounting the projection system to the reference frame while projecting the patterned beam of radiation onto the target portion.

12. A method according to claim 11, wherein the projection system comprises at least one optical element mounted on a projection frame that is compliantly mounted to the reference frame and an eigenfrequency of the projection frame compliantly mounted to the reference frame is between about 10 and 30 Hz.

13. A method according to claim 11, wherein an eigenfrequency of the reference frame compliantly mounted to the base is about 0.5 Hz.

14. A method according to claim 11, wherein the projection system is compliantly mounted to the reference frame by at least three compliant mounts.

15. A method according to claim 11, wherein the projection system is compliantly mounted to the reference frame on nodal axes of a dominant mode of bending vibration of the reference frame or a torsional vibration of the reference frame.

16. A method according to claim 11, wherein the projection system is compliantly mounted to the reference frame by at least one compliant mount, the compliant mount comprising:

a T-shaped member with one of the projection system and the reference frame attached to both ends of a first elongate member of the T-shaped member and the other of the projection system and the reference frame attached to an end of a second elongate member of the T-shaped member.

17. A method according to claim 16, wherein the T-shaped member has an internal first eigenfrequency that is greater than 1000 Hz.

18. A method according to claim 11, wherein the projection system is compliantly mounted to the reference frame by at least one compliant mount that is one of an air-mount, a spring and a magnetic support.

19. A method according to claim 11, wherein motion of the projection system relative to the reference frame is damped.

20. A method according to claim 19, wherein the motion of the projection system relative to the reference frame is actively damped by piezoelectric actuators or Lorentz-force actuators.

21. A lithographic projection apparatus, comprising:

- a radiation system constructed and arranged to provide a projection beam of radiation;

- a support structure constructed and arranged to support a patterning device, the patterning device constructed and arranged to pattern the projection beam according to a desired pattern;

- a substrate table constructed and arranged to hold a substrate;

- a projection system constructed and arranged to project the patterned beam onto a target portion of the substrate;

- a base to which the support structure and the substrate table are mounted;

- a reference frame mounted to the base, wherein the projection system comprises at least one optical element mounted on a projection frame that is mounted to the reference frame;

- at least one first isolation mount operatively between the reference frame and the base to inhibit vibrations or movements of a predetermined type from being transmitted from the base to the reference frame; and

- at least one second isolation mount operatively between the reference frame and the projection frame to inhibit vibrations or movements of a predetermined type from being transmitted from the reference frame to the projection frame.